UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Ground Water Branch

A BRIEF SUMMARY OF GROUND WATER IN THE FURNACE CREEK WASH AREA, DEATH VALLEY NATIONAL MONUMENT, CALIFORNIA

Prepared at the request of the
National Park Service

Sacramento, California
1963

IN REPLY REFER TO:
CAL-681

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Room 3021 Federal Building
650 Capitol Mall
Sacramento, California 95814

November 15, 1963

Memorandum

To : Regional Director, Western Region, National Park Service,
100 New Montgomery St., San Francisco, Calif. 94105
Attention: Mr. Ketcham

From : District Geologist, Ground Water Branch,
Sacramento, Calif.

Subject: DEATH VALLEY NATIONAL MONUMENT--'A brief summary of ground water in the Furnace Creek Wash area, Death Valley National Monument, Calif.," by Fred Kunkel, U.S. Geological Survey rept. released to open file December 10, 1963.

In response to a request by Mr. Ketcham there are enclosed four copies of the subject report.

Under separate cover, we are sending six copies to Mr. Ed Reed, Chief, Water Resources Section, NPS, Washington, D. C.

Fred Kunkel

Enclosure (4)
cc w/encl:
Mr. Ed Reed, Washington, D. C.

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By Fred Kunkel

In October 1955 the Geological Survey, at the request of the National Park Service, began an investigation of the occurrence of ground water in the Furnace Creek Wash area of Death Valley National Monument (fig. 1). The results of that study are given in U. S. Geological Survey duplicated open-file report, "A brief geologic and hydrologic reconnaissance of the Furnace Creek Wash area, Death Valley National Monument, California," by M. A. Pistrang and Fred Kunkel, 1962. The findings contained in that report are briefly stated in this summary. Also presented is the geologic map (fig. 2) from Pistrang and Kunkel (1962) and an additional illustration depicting schematically the occurrence of ground water in the area (fig. 3).

Ground water in the Furnace Creek Wash area is part of a single interrelated and interconnected hydraulic system. However, the ground water has several modes of occurrence. The principal occurrence ~~of ground water is in the vicinity of Texas and~~ in north of Travertine springs where a canoe-shaped syncline (figs. 2 and 3) contains unconsolidated alluvial deposits of sand and gravel washed down from the Funeral Mountains in the eastern part of the area shown by figure 2. The

sand and gravel of the alluvial deposits are permeable and beneath the water table all the pore spaces in the deposits are saturated. The rocks that form the syncline are semiconsolidated to consolidated and, except for water in cracks and fractures, are poorly water bearing. The water in the unconsolidated deposits, shown diagrammatically in figure 3, does not occur and move in distinct channels but percolates from high head or water level through all the pore spaces beneath the water table to points of low head or discharge.

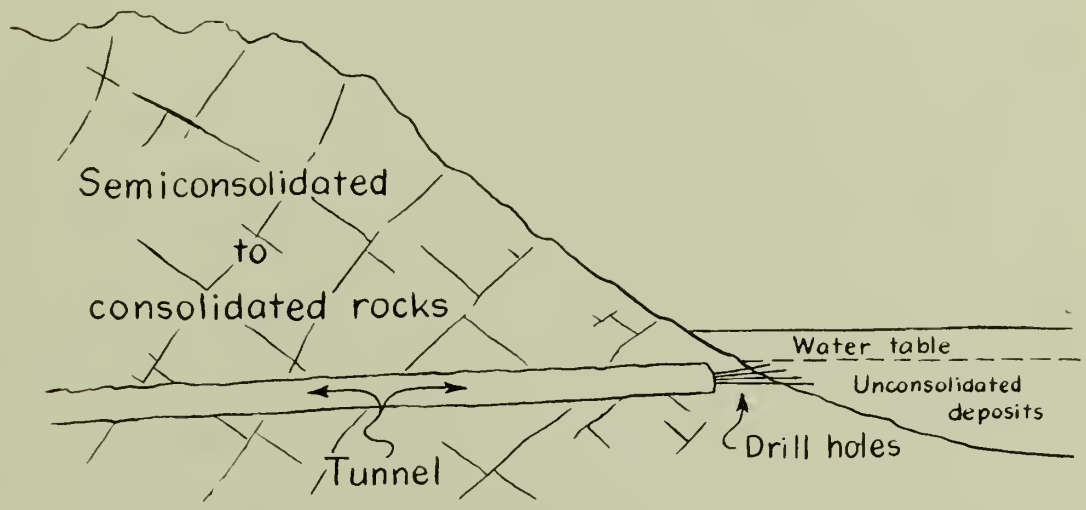
The springs of the Texas-Travertine area occur where the water table intersects land surface or where intersecting cracks and fractures in the semiconsolidated and consolidated rocks in direct continuity with the water in the alluvium intersect land surface. A tunnel such as the Texas spring tunnel or a water well such as the test well drilled in sec. 24, T. 27 N., R. 1 E. (fig. 2) by the Park Service also draws water from the water body in the alluvium. Consequently, any water pumped by the well or intercepted by the tunnel must reduce the water discharged by the springs or other downstream diversions.

A second occurrence of ground water in the Furnace Creek Wash area is in the unconsolidated deposits of boulders, coarse gravel, and sand that occupy the bed of Furnace Creek Wash. Upstream from about the west edge of sec. 31, T. 27 N., R. 2 E. (fig. 2), where owing to a man-made ditch to divert the flood flow of Furnace Creek Wash into Gower Gulch the full thickness of the unconsolidated deposits can be observed in the streambed to be completely unsaturated. However, from about the east edge of sec. 26,

T. 27 N., R. 1 E., water occurs at or near the surface in the unconsolidated alluvial deposits. In sec. 26 the alluvial deposits are dewatered by a sump and buried tile.

The water contained in the alluvial deposits of Furnace Creek Wash is percolating ground water derived from the same common source of recharge as water in the syncline. However, the alluvial deposits in the wash are contained in a well-defined channel of semiconsolidated to consolidated rocks.

A third occurrence of ground water in the Furnace Creek Wash area is in the vicinity of the Furnace Creek Inn. At that site, a tunnel drilled through semiconsolidated to consolidated rocks intercepts small quantities of water in cracks and fractures. However, the end of the tunnel driven from north to south was stopped in the consolidated rocks, and a number[1] of drill holes about 2 inches in diameter were drilled ahead from the face of the tunnel until they tapped the water bearing unconsolidated alluvium of Furnace Creek Wash as shown by the sketch below. A flow of about 0.3 cfs discharges from these drill holes.



1. The number was not counted but to the best recollection of the writer was on the order of 8 to 12.

The total estimated flow of ground water in the Furnace Creek Wash area in 1956-57 was as follows:[1/]

Type of occurrence	Discharge (cfs)	
I. Water from the synclinal area		
1. Travertine springs diverted to DVHCo irrigation system	1.9	
2. Texas spring tunnel	.5	
3. Undeveloped springs, seeps, or phreatophyte areas (estimated)	.1	
4. Evapotranspiration above points of measurement	.5	
Subtotal		3.0
II. Furnace Creek Wash		
5. Sump	1.3	
6. Buried tile	.4	
Subtotal		1.7
III. Furnace Creek Inn area		
7. Tunnel	.3	
8. Underflow to Death Valley	Unknown	
Subtotal		.3
Total		5.0

1. There has been no appreciable change to date (July 1963).

All the details of the hydraulic system are not perfectly understood. However, the relationships between the various parts are such that any substantial withdrawals from the synclinal area ultimately will have an effect on the amount of water available in Furnace Creek Wash and at the Inn. Development in Furnace Creek Wash probably will have no effect on the discharge from the synclinal area but will have an appreciable effect on water available at the Inn. Further development at the Inn probably will have no effect on the synclinal area or in Furnace Creek Wash except possibly to intercept underflow in the wash that now wastes to Death Valley.

Underflow from the Furnace Creek Wash area ultimately discharges into a water body beneath Death Valley. That water body, however, is brackish to very salty and probably cannot be considered as a source of potable water except along the margins of the area where some underflow from tributary drainage might be intercepted.

Underflow that can be intercepted before it discharges into the body of salt water may be a source of potable water. A sample of water collected by T. W. Robinson (personal communications) on Feb. 27, 1963, from an auger hole in the NW¼NE¼ sec. 16, T. 27 N., R. 1 E., at a depth of 19 to 20.5 feet had a chloride of 370 ppm and a specific conductance of 3,600 micromhos. This is not potable water, but could be used to irrigate some salt-tolerant plants such as tamarisk and bermuda grass. Also any development by drilling wells and pumping in this area probably would be a skimming operation, but properly operated, probably could augment the potable supply.

FIGURE 1

FIGURE 1. - INDEX MAP OF CALIFORNIA

U.S. GEOLOGICAL SURVEY

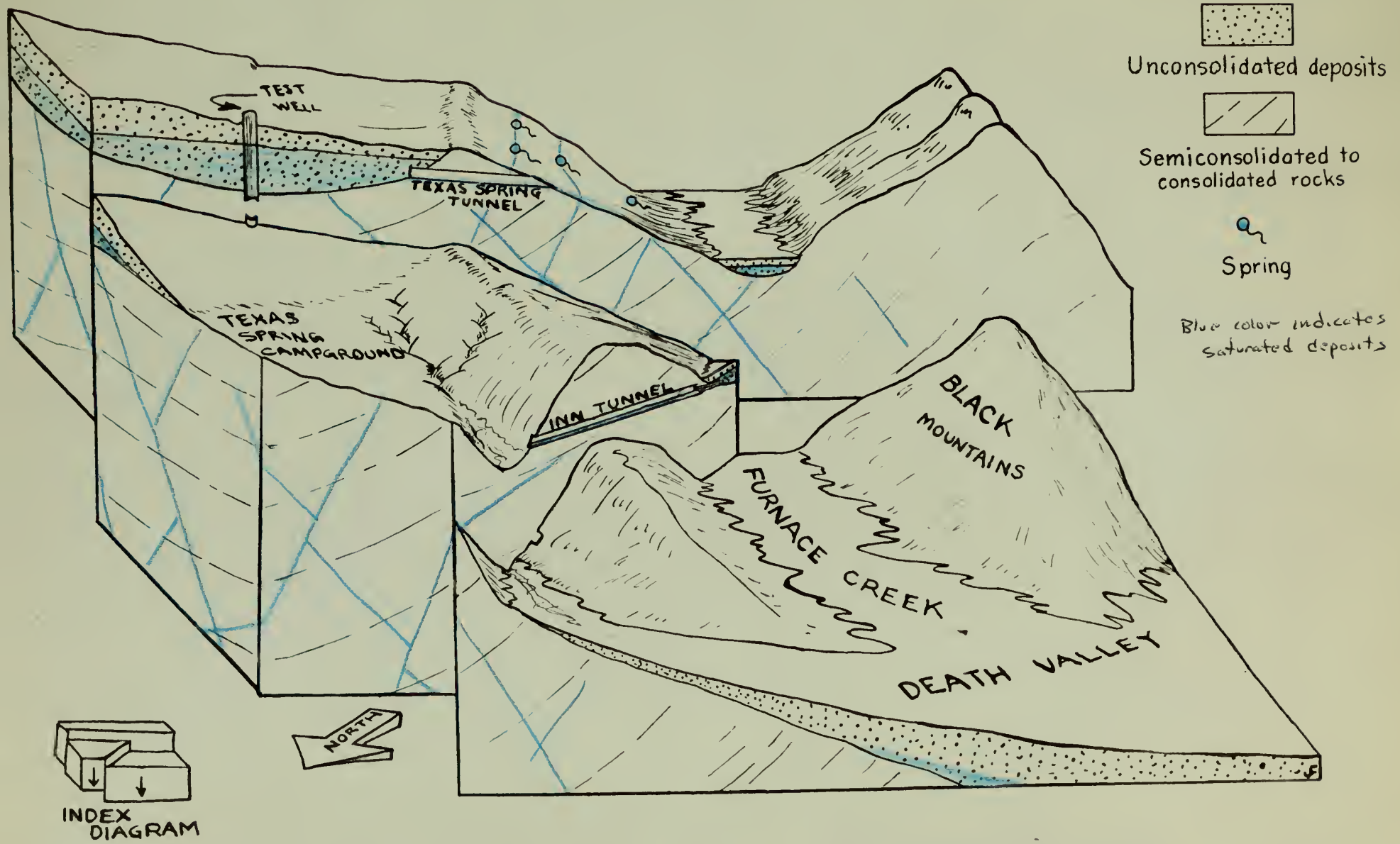


FIGURE 3._ SCHEMATIC BLOCK DIAGRAM OF THE FURNACE CREEK WASH AREA
DEATH VALLEY NATIONAL MONUMENT